

## **Drawings**

Fig 5 is amended by removing the lead line from reference numeral 50 to the output of the level-dependent filter 46. Attached is a substitute sheet 3/8 with the corrected fig 5. Also attached is a copy of the original sheet 3/8 marked in red to indicate the change.

**Information Disclosure Statement by Applicant**

Attached is an amended information disclosure statement and a copy of the original marked in red to indicate the corrections. There are two corrections, both on the first line of document information. On that line, replace [3,158,825] with 3,158,835. Also, replace [Ortho] with Otho.

**Remarks**

The claims have been rewritten to more particularly show the novelty of the invention. Claims have also been rewritten to eliminate language objections.

**Yun uses microphones as components of position sensors. Yun does not sense environmental sounds.** Yun (US 2003/0108212 A1) uses microphones on the host vehicle as part of a position sensing device that includes sound generating components paired with the microphones. The microphones in Yun's system are parts of acoustic distance measuring sensors. They do not sense environmental sounds made by nearby objects, which is the function of microphones in the applicant's invention. Yun's microphones sense the sounds produced by Yun's sound wave generators. Yun is explicit in this matter stating in his claim 1, "...a plurality of sound wave sensors mounted on front and rear parts and left and right sides of the vehicle, each of which includes a sound wave generator for generating sound waves directed towards objects and a receiver for receiving sound waves reflected from the objects..." **For this reason, Yun does not anticipate claim 1 or claim 20.**

**Yun's signal processing is not primarily amplification.** Yun's signal processing must use data from the position sensors to calculate positions of objects near the host vehicle, decide about the importance of these nearby objects, and generate a warning for the driver if appropriate. This is in contrast to the much simpler signal processing of the applicant's system whose predominant function is amplification of microphone signals. **For this reason, Yun does not anticipate claim 1 or claim 20.**

**Yun's system is conventional.** As described in the applicant's specification, typical prior-art systems use technically advanced sensors using technologies such as ultrasound. They have signal processing systems that must interpret data from sensors. Yun's system has these characteristics of typical prior-art systems and the applicant's system does not. The only similarity to the applicant's invention is that both the applicant and Yun use audio interfaces to the driver.

**Yun's system would never aid the hearing of conversations outside the vehicle.** His signal processing looks for reflected sounds from his sound generators and calculates positions of sound-reflecting objects. Yun does not help the driver hear conversations outside his vehicle and so does not anticipate claims 6 or 7.

**Yun does not anticipate claim 12.** Yun's fig. 2 "signal from 2 to SP1-5" represents a bus, a collection of signals that is drawn as a single line for the purpose of presenting an architecture in an uncluttered drawing. Yun focuses on presenting sounds to the driver using multi-channel speakers creating a driver interface that is inspired by home-theater entertainment systems. Such sounds can be fully appreciated only by a driver with two good ears. Yun makes no effort to accommodate a driver with one ear better than the other. In addition Yun does not anticipate the applicant's claim 1 since Yun does not sense environmental sounds, as described above. For these reasons Yun does not anticipate claim 12.

**Yun does not anticipate claim 13 or claim 14.** Yun does not disclose a system that uses microphones to sense environmental sounds. Further, his signal processing does not change frequency response properties based on a control signal which critically depends on directionally discriminating microphones to provide signals that indicate a source of an environmental sound that is not the host vehicle, claim 13. Yun does not anticipate claim 14 because he does not anticipate claim 13 or claim 1.

**Directional microphones and frequency** Those skilled in the art of directional microphones understand that for a given size of directional microphone, there will be a frequency range for which the directional discrimination works well, and at lower frequencies, the directional discrimination will deteriorate. For excellent directional discrimination, at least one physical dimension of the microphone should be larger than the wavelength of the lowest frequency of sound for which the microphone needs to be discriminating. This is described in the specification. Claim 13 has been modified to clearly describe how signal processing can be used with directionally discriminating microphones that are effective for only the higher frequency components of the sounds of interest, to control the response of the entire frequency range of interest.

**Takeuchi uses microphones as components of position sensors.** Takeuchi, US 4,528,563, also uses microphones paired with sound sources as ultrasonic position sensors, what could be described as acoustic radar. Takeuchi's microphones are position discriminating to provide both direction and distance information from a single set of ultrasonic energy transmitter and receiver. Takeuchi's microphones do not sense environmental sounds and they do not discriminate against sounds such as tire noise made by the host vehicle. The applicant's claims do not read on Takeuchi.

**Yun does not anticipate claim 15, 16 or 17.** Yun does not disclose a system that senses environmental sounds. This difference between Yun and the applicant's invention does not change if Yun is combined with Takeuchi. Consequently, Yun does not anticipate claims 15, 16, or 17.

**Applicant's system does not read on Yun.** The applicant has modified his claim 1 to emphasize differences from Yun. The applicant has modified his claim 20 to emphasize differences from Yun.

**None of the cited references teach use of a microphone for sensing environmental sounds.**

None of the references cited in the first office action use microphones to sense environmental sounds for the purpose of reproducing environmental sounds in a controlled manner inside the vehicle. For this reason alone, no combination of Yun, Takeuchi, Farmer et al (US 5,979,586), Werrbach (US 6,266,423 B1), Sindle (US 5,173,881), Kawakami (US 6,407,733) and Marshall (US 2,131,593) anticipates any of the applicant's claims.

**The Combination of Yun and Takeuchi would not work well.** Although neither Yun or Takeuchi anticipates the applicant's invention, the combination of directional microphones (Takeuchi) with Yun would be inappropriate because Yun's microphones are omni directional (fig. 5a, fig. 5b) in order to accept reflected sound waves from a wide angle and from at least three sound wave sources. Yun gets position information by considering distance information from multiple sensors.

**Combination of Hipkins with directional microphones is not obvious.** The examiner was helpful and correct to raise the question of combining directional microphones with prior art. The only known example of prior art on which the applicant's invention builds is Hipkins, US 3,158,835. This combination of Hipkins and directional microphones is not obvious to one skilled in the relevant arts because the sounds made by a vehicle traveling on a highway involve a wide frequency range including low frequencies with wavelengths that can not be effectively discriminated for and against by microphones that are small enough to easily be accommodated on an automobile. For a microphone to be directional for the range of frequencies that are important in his application, the microphone would need at least one dimension that would be much larger than typical car tail lights. The applicant's invention teaches how to use small directional microphones, which are directional for only the higher frequencies of the environmental sounds of interest, to control gains for the entire frequency range of interest. Since the advantages of the applicant's invention are not expected by those skilled in these arts, this invention is not obvious under U.S.C. 103(a)

**Combination of Hipkins with directional microphones was not tried for thirty-nine years.** Another fact that indicates that this invention is not an obvious combination, under U.S.C. 103(a), of directional microphones and the prior art of Hipkins, is that this combination was not suggested by others in the thirty-nine years between when Hipkins issued and the filing of the applicant's application.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Submitted by



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